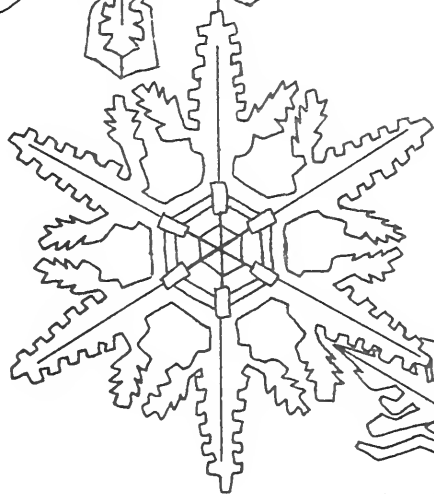
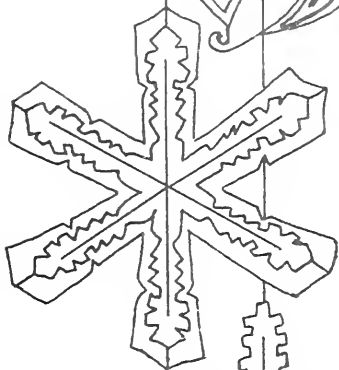


LEADER



FALL-WINTER 1968

DELAWARE VALLEY COLLEGE

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GLEANER
FALL-WINTER
1968



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DOYLESTOWN, PENNSYLVANIA 18901

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STATEMENT OF PURPOSE

THE GLEANER is the literary and scientific journal of Delaware Valley College of Science and Agriculture. This journal is published twice each school year.

THE GLEANER was the first of the college's publications and dates back to 1901. This year the magazine is undergoing a metamorphosis. We feel that this change is for the best. THE GLEANER will not only continue to feature articles in the realm of literature, but is adding, as of this issue, creative photography and technical and semi-technical articles in the fields of Science and Agriculture. We also plan to spotlight local attractions such as those you will find in this issue.

THE GLEANER is a separate entity and is in no way integrated with the college newspaper, THE FURROW. We have, for example, included few news articles in THE GLEANER. We can not accept any responsibility for any plagiarism included within, as it is impossible to check all the sources from which the articles may have come.

The editors invite suggestions and criticisms, as this is a magazine by the readers and for the readers. Address your comments to:

THE GLEANER
Box 908
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Doylestown, Pennsylvania 18901

We sincerely hope that you enjoy this issue and appreciate the efforts of our writers.

Carl Pfitzenmayer, *Co-editor*
Quentin Schlieder, *Co-editor*



Dr. Paul R. Bowen

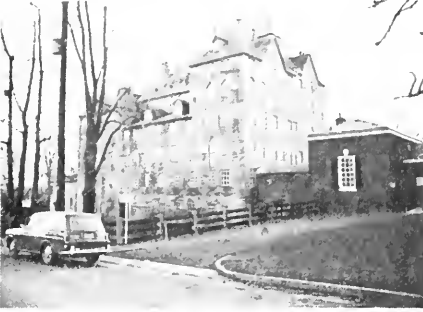
With this inaugural issue of the expanded GLEANER, we feel honored to be able to dedicate it to Dr. Paul R. Bowen, Professor of Biology. We salute this man for the sincere interest he has shown towards the Student body and the College.

Dr. Bowen came to Delaware Valley College, which was then the National Agricultural College, from Valley Forge Military Junior College in 1946, as head of our Biology Department and as Dean of the Graduate School.

Having received his Bachelor of Arts Degree from DePauw University in 1925, Dr. Bowen went on to become a Sterling Scholar (1928-29) and an Eaton Scholar (1929-31). He received his Masters degree and Doctorate from Yale University in 1929 and 1931, respectively.

With interests in mycology and phytopathology of trees, Dr. Bowen has relinquished his teaching duties to devote his full attention to the College's herbarium.

“TOUR THE MERCER MUSEUM”



The Mercer Museum

Credit: L. Ivins Smith III

According to the tour guide pamphlet “The museum, a reinforced concrete structure, was built by Dr. Henry Chapman Mercer in 1916 to house the collection which is arranged in 33 fireproof rooms and 36 alcoves on four galleries surrounding a central court.”

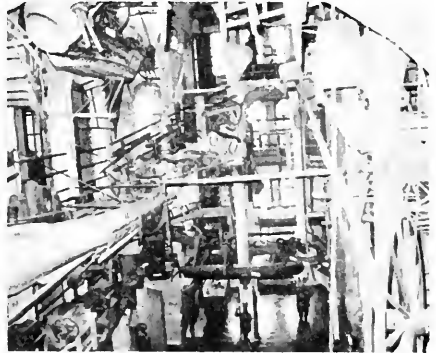
That statement explains the “when” and the “why” of the museum but leaves the “what” wanting a little more attention. The “what” is first of all a big concrete building — a really big concrete

building that looks for all the world, both inside and out, like it should be surrounded by a moat and house not relics of early American endeavor but instead Charlton Heston, grinding his teeth somewhere in the upper reaches of the north tower. Not only does it look like a castle but it feels like a castle, for to understate the point, the Mercer Museum is a bit drafty, especially around ankle level.

Being forewarned you can be forearmed so pull on a pair of heavy wool socks, pay your special student rate at the desk, walk through the iron door and down the stairs to the “central court.”

Greeting you will be various means of horse drawn transportation, especially in the form of sleighs, all set around the perimeter of the area. Walk around and notice the different fine points of construction and design of what you see and take just a little time to realize everything was made without the benefit of power tools. If you happen to like wooden Indians, these too can be found in this area.

Now walk to the middle of the “central court” and look up. This is probably the single most impressive view of the museum. The court has only one ceiling, the roof of the building, and that is way up there! There are two reasons that make this view so outstanding. The first and most obvious reason is the size and number of articles suspended above your head, reaching all the way to that high ceiling. There are innumerable wagons, a whale boat, and other large items hanging or protruding from the three overhead balconies. The numbers dominate your attention and blend everything together into a blur that defies you to identify single objects. Then, after your attention begins to focus on individual items, you begin to wonder how in the world they all got there, who put them there, and how do they all remain attached?



The Central Court showing the whaling boat, wooden Indians and other paraphernalia of early Americana.

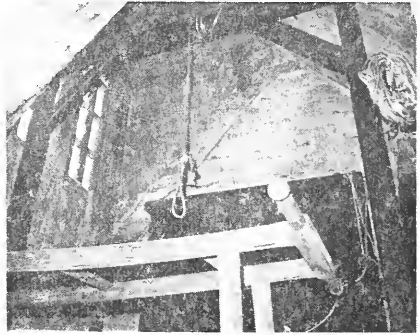
Credit: L. Ivins Smith III

If you ponder for a moment you suddenly hit upon an observation that rather shocks you at first and then heightens your appreciation for the entire museum. Everything you see did not just appear here and, although you never really thought about it before, it all is here as a result of someone's great effort. By realizing this, and that what you are looking at was once not a curiosity but a common article in someone's existence, you can thoroughly enjoy your tour.

After leaving the "central court," wander up the stairs to the overhead balconies and proceed in a circular pattern. You will find most articles placed in glassed-in alcoves that are arranged so as to keep their contents in context, not only in time, but in use. However, not everything appears in the alcoves and if one word is used to describe the museum it has to be "cluttered"; for nowhere will you look and not see something, and usually you will see not one, but many of the same things.

You will not know what many of the items are and it is interesting to try and decide first what you are looking at, and then how it was used. If you take a girl you can amaze her with your vast knowledge of early implements and perhaps feel a little "put down" when she identifies something which is unknown to you.

Eventually you will come to the north tower and the dog tracks, which are large enough to have been made by the hound of the Baskervilles, set in the concrete steps setting the mood. When you reach the top of the tower you can browse among the caskets and the horse drawn funeral hearse. Then looking up you stare through the trap door of an old gallows and see the quaint noose swaying gently overhead.

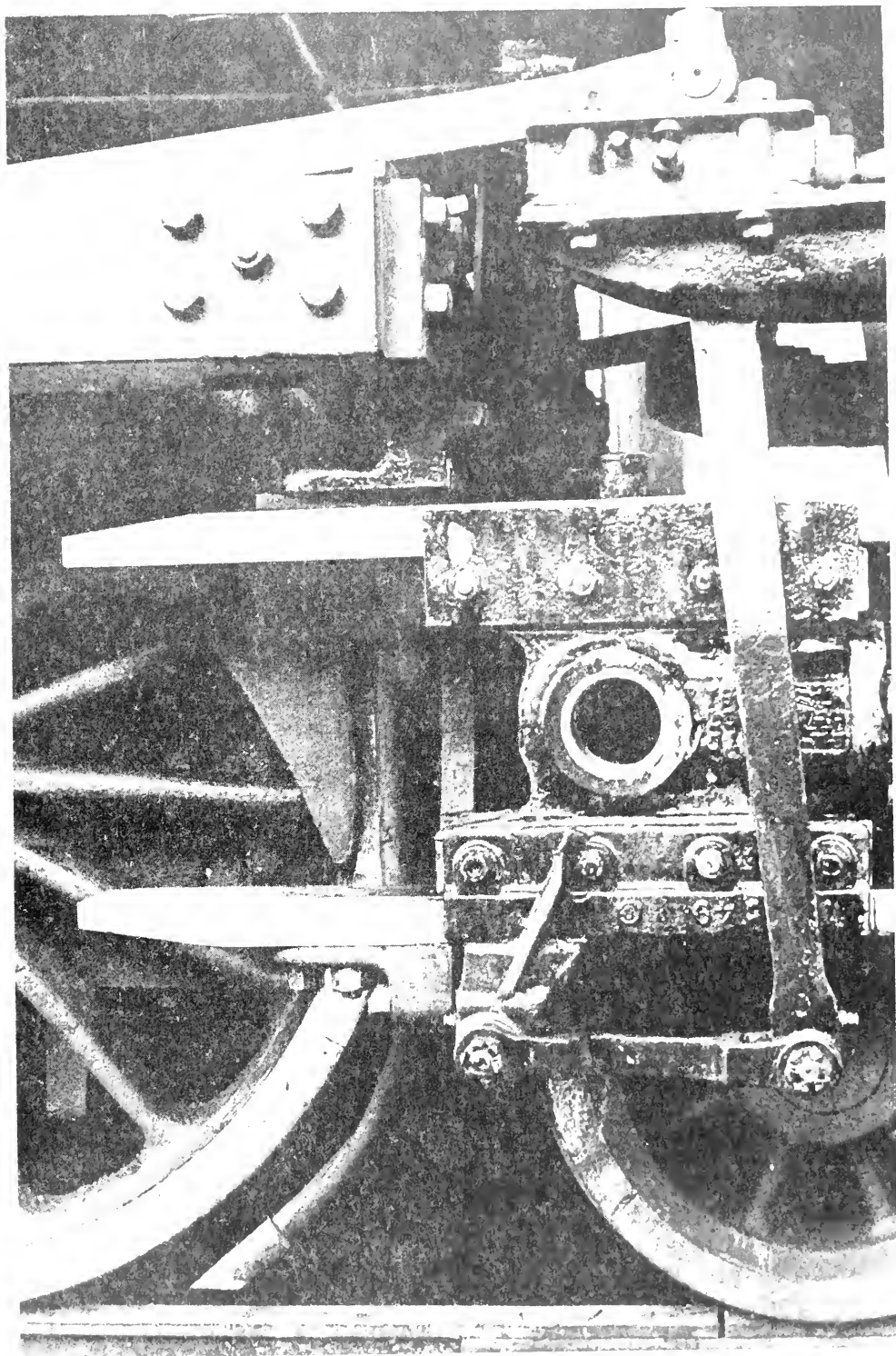


The Famous Gallows

Credit: L. Ivins Smith III

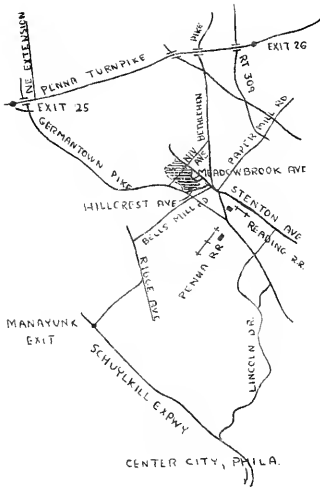
After making sure that Charlton Heston isn't up there sharpening his broadsword you can descend back into the full daylight and enter the street, perhaps a little better off than you would have been had you spent that quarter for something else.

The Mercer Museum can only be fully appreciated by being seen and considering people do come from all over the country to visit it, you wouldn't be fair to yourself if you lived in Doylestown for four years without seeing it at least once. And it certainly does answer the question nicely, "What is there to do around here on a Saturday afternoon?"



Credit: L. Ivins Smith III

THE MORRIS ARBORETUM



Location of Morris Arboretum

Few areas where man can escape the routine and pressures of the city have been set aside. In Philadelphia, there is one such retreat located in the Chestnut Hill section of the city. Morris Arboretum, a 175 acre enclave left to society in 1932 by the foresighted John T. Morris and his sister, is operated by the University of Pennsylvania under the auspices of the Department of Botany.

Plant material far from the ordinary thrives on the rolling acres of the arboretum. It is one of the best representative collections of hardy plant material available for study in this climate.

One of the most unique features of the arboretum is the unusual quartzite ridge that forms the geological base for the soil there.

The ridge and its south slope provide soils of an acid nature¹, important in the culture of coniferous and ericaceous plants. This ridge extends from the Administration Building to the Wissahickon Creek, where it terminates in a vertically tilted outcropping.

Morris Arboretum is a palette of nature's many hues. The color of the arboretum is striking in all seasons.

Among the many genera lending to this spectacular color at the arboretum are the hollies, including many red berried, and a few white berried species. Further down the slope are two outstanding Blue Atlas Cedars (*Cedrus atlantica glauca*).

Within sight of the rich hues of these cedars is the heath and heather garden. Among the plant materials in this area are *Kalmias*, *Vacciniums*, and *Gaultherias*. A rather comprehensive collection of heaths (*Ericas*), heathers (*Callunas*), and Scotch brooms (*Cytisus*) can be found in this section. When mild weather is at hand this garden is a rainbow of pastel colors.

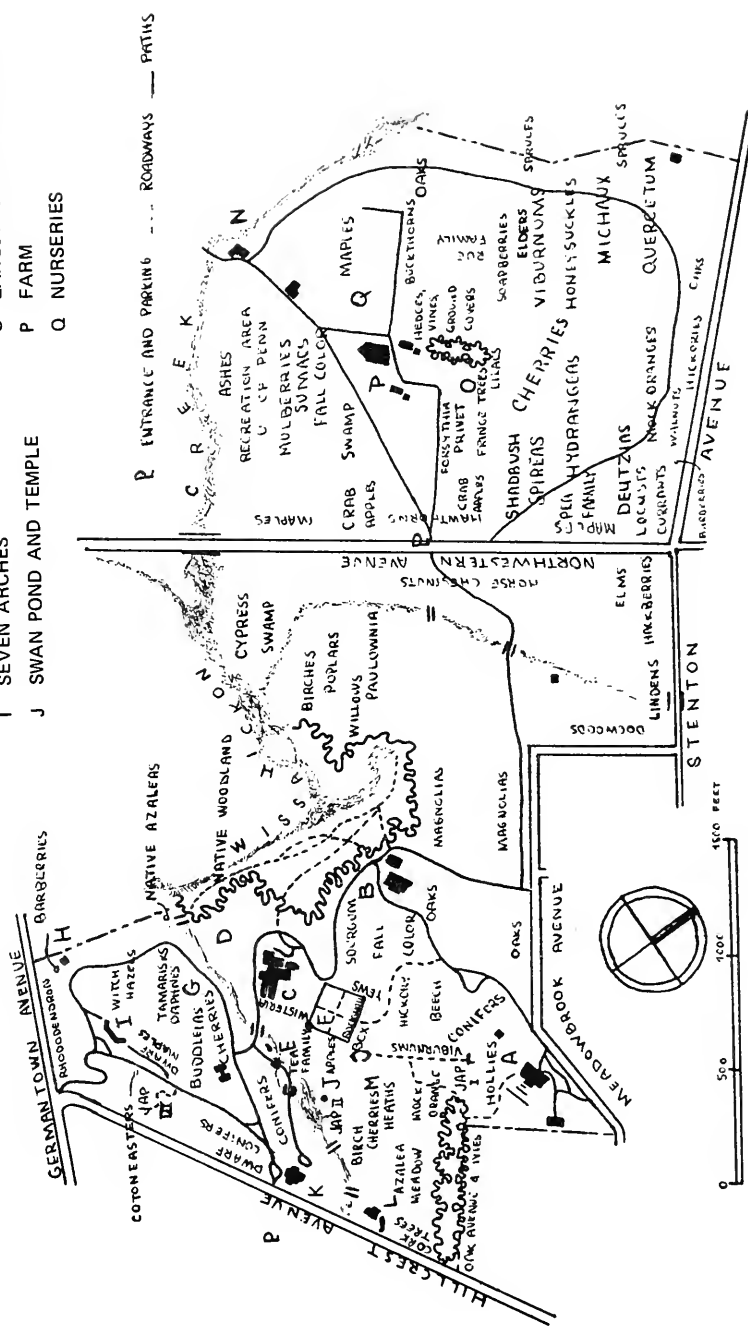
The southeast corner of the slope contains an open area known as the azalea meadow. In spring, this meadow is splashed with bold color. A row of oaks form a magnificent backdrop to this scene. Under these oaks is a superb collection of ivies.

To the west of the azalea meadow is the Swan Pond and the Japanese Garden containing many maples, junipers, and pines. In order to create the illusion of depth, the area was regraded into short, steep mounds.

Another popular feature is the medicinal garden. Although this garden lacks the aesthetic value of many of the other gardens, it is a rather complete

¹The acid nature of these soils is due to the slow weathering of the quartzite in an area of high rainfall.

- | | | |
|-------------------------------|------------------------|-------------------------|
| A GATES HALL - ADMINISTRATION | E LOG CABIN | K LODGE |
| B GARAGE | F ROSE GARDEN | L SPRINGHOUSE |
| C GREENHOUSE AND FERNERY | G BOG GARDEN | M BAXTER MEMORIAL |
| D MEDICINAL GARDEN | H MERCURY | N STEEPER'S MILL |
| | I SEVEN ARCHES | O LANGSTROTH BEE GARDEN |
| | J SWAN POND AND TEMPLE | P FARM |
| | | Q NURSERIES |



Map of Morris Arboretum, Chestnut Hill



Flowering Cherry and the Morris Mansion which has since been razed.

Credit — Angus Heeps

The most colorful garden in the summer is the formal rose garden. This is bounded on three sides by a dry wall containing many interesting and unusual rock garden specimens.

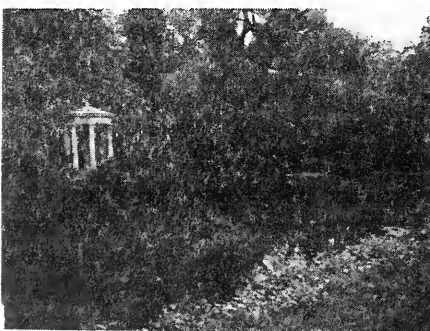
On the northern exposed slope are alkaline soils derived from limestone. These soils support collections of flowering cherries, crab-apples, lilacs, locusts, ashes, viburnums, honeysuckles, and barberries. The Michaux Quercetum (a collection of oaks) occupies a tract of about ten acres along the northern and eastern boundaries.

Four acres have been allocated for demonstration gardens containing hedges, vines, and ground covers.



Heath and Heather Garden, Morris Arboretum.

Credit — Q. Schlieder



The Swan Pond, Morris Arboretum

Credit — Angus Heeps

visit to Morris Arboretum. It is open to the public from 9:00 a.m. to 5:00 p.m. daily, free of charge.

collection of plants valued for their healing qualities. Some of the many genera represented include *Digitalis*, mint, poppies, and garlic.

The arboretum has a propagating house, a potting shed, and a greenhouse in which the medicinal collection is overwintered.

Perhaps one of the least known, most unique, and most interesting features of the arboretum is the Tropical Fernery. Among the distinctive specimens housed within this structure are Stag-horn Ferns (*Platycerium*), Tree Ferns, etc.

Presently the Administration Building (Gates Hall), containing the library, lecture room, and offices, is being refurbished.

The staff of the arboretum consists of a Director, Taxonomist, Pathologist, Superintendent, Propagator, and a working crew of about twelve men.

One of the least expensive and most valuable experiences which can enrich your association with plant materials is a

Editor's Note: We wish to thank Angus Heeps, Superintendent of Morris Arboretum for the photographs which appear with this article. The maps are redrawn and revised from one of the arboretum's pamphlets.

PROPERTIES OF THE PROCESSING TOMATO OF THE FUTURE

As dependable and skilled labor to harvest tomatoes becomes harder to find each year, and as acreages increase, there is a drastic need for the development of mechanical harvesting.

Since nature has not provided plants that are adapted for mechanical harvesting, extensive plant breeding programs have been developed by large concerns and state universities.

In mechanical harvesting of tomatoes one of the most important aspects is the development of the plant itself.

Determinately vined plants (plants having less than three sets of leaves between blossoms) are desirable, while indeterminately vined plants (three or more sets of leaves between blossoms) are not, because determinately vined plants are more uniform in size and they don't spread out over the field.

Other things to look for in a plant are resistance to various diseases, vigor, coloration, and strength in the stems leaves which supply nutrients to the plant and provide support for the plant and fruit.

As for the fruit itself, a good uniform color is necessary both internally and externally, along with a favorable pH. A pumiforme (plum-shaped) form with a tough skin is also sought after.

Finally one of the most important objectives of the breeder is to get a high-yielding plant, since a minimum yield of fifteen tons per acre is needed to make mechanical harvesting profitable.

Although these are the most important traits to be considered in the fruit and plant of the tomato, there are many other factors which enter the picture. Currently researchers throughout the world are studying these and other factors.

John D. Martin '70

LIFE AND DEATH OF A PUMPKIN

The ground broke, and a tiny green speck popped from beneath the earthy crust. Days passed and the green spread like a creeping mound — growing, ever growing. Then, after weeks of time, splotches of orange color appeared, then fell to the ground to rot. After awhile, green bulb-like structures appeared where the blooms had been. They grew and expanded and changed to an orange hue. Then the frosts came. Soon the first snows of winter closed in and the orange pumpkin, in the freeze and thaw of winter, disintegrated into a rotten, black pile of decayed and fermenting pulp.

THE MIRACLE OF BIRTH

I wish to express my appreciation to my father, John Scott, for his invaluable assistance in preparing this article. He willingly took time out of his full day to take all of the pictures presented in conjunction with this article.

My father and I have a thirty cow, registered Holstein herd averaging 13,996 pounds of milk, and 481 pounds of butterfat. Our farm is located one mile east of Bloomsbury, New Jersey.

The cow in the article is a Star Man daughter, and her calf is a Gent daughter.

The miracle of birth is one of nature's wonders which few people have witnessed. Some people look upon the phenomenon of birth with distaste. However, I feel that birth is a special moment seldom seen and more often misunderstood. I hope that this article can enlighten many, and can convey my feeling about this special moment to others.

On our farm, as on others, the birth of a calf is a moment of joy and thanksgiving.

In the dairy industry, adult cows are managed so that they are pregnant most of their lives. A period of nine months gestation is required for the development of the calf within the cow.

Upon termination of the gestation period, the mother will sense that the time for delivery is close at hand. If the cow is in housing she will become nervous and begin to shift back and forth. If she is outside she will instinctively leave the herd and find a secluded area in which to give birth to her calf.

Just preceding birth, the calf falls into position for delivery within the cow's uterus. After the calf has become positioned, the muscles around the uterus begin to contract, causing the membrane around the fetus to rupture, and the fluid in which the calf is suspended to be released. Muscle contractions around the uterus and in the birth canal force the calf to be expelled. These muscle contractions occur at short intervals and the front legs of the calf begin to appear from the vulva at the end of the birth canal. Within minutes the calf's head appears, followed by its shoulders. After the calf's shoulders have passed through the vulva, the calf's entire body slips free from the cow rapidly. Due to this rapid movement, the placenta is severed, and the moments of birth have passed.

The cow and the calf rest for several moments due to the great stress both have endured. The first signs of life can be seen when the calf begins to shake its head and cough up the fluid in its respiratory tract. The mother arises and licks the fluid from the calf's body. Her coarse tongue stimulates the calf's circulation.

Within an hour the calf stands, takes its first steps, and begins to nurse.



SAND

In the bright light a woman wept as flashes of white worked busily into the night. But Jim just lay there thinking, just thinking.

It didn't seem possible that twenty years had passed; yet it had. It was so hard to realize that so much life had sped by, and even harder to accept the fact that he had so little to show for it.

All that came to his mind were the shelves of trophies, ribbons and awards that lined his father's room. And in another corner of his mind he could look into his own room and see nothing denoting any accomplishment except perhaps the model plane he had constructed before his father's death.

Grammar school and high school were over and two years of college spent. What had he to show for these years — marks?

He was a receptive student but with work and all, he always had to fight to keep those grades up. What good were grades now? What good was knowledge now, for that matter? It couldn't change fate. "What a damn fool I've been," Jim thought, "working like a God damn idiot, working for tuition, working for and idolizing those precious grades, those all important grades."

Have to go to college . . . College Boards . . . Do you want to be a failure? . . . Have to get a high mark . . . Have to get those grades . . . Fill in those applications for college . . . Make a selection . . . Have to make the correct selection . . . Can't make a mistake . . . What would father have said? . . . Cost . . . College costs money . . . Work — Work — Have to work . . . Study — Study — Have to study . . .

All of these mixed-up thoughts raced through his mind as he lay there motionless. All the fun of life had passed him by. He had worked hard, too damn hard, he thought. Life had been just one rank existence. The hours of the day had been like grains of sand; the years like deserts.

He envisioned his life as a giant hourglass with sand speeding from top to bottom. He was now more than ever satisfied that what he had done was for the best. He would soon be free.

The image of the hourglass slowly seeped back from whence it came. Jim found himself somehow transported to his father's grave and he remembered the day his father had died.

At the time of his dad's death he was only nine years old, but henceforth there would be no more time for foolishness, just work. And ever since that time, with each passing year, his love of life slowly vanished.

It became increasingly hard for him to think. All that his mind could see now were faces; perhaps they were his classmates. They are talking about me again, they're laughing at me. They always hated me because I wasn't a joiner, but I never had the time. I had to work. I was going to be something someday. I was going to be something. His mind seemed to shout at the imaginary countenances. But the faces still smiled and slowly vanished into the darkness. His thoughts were getting very erratic. Flashes of color, like fireworks, faces and sounds, all began reverberating like a Coney Island light show. Then there were moments of darkness, ever growing, ever growing. Thank God it's almost over, his mind throbbed, thank God! His total being

was soon enveloped in the lifeless dark unknown as the last grain of sand slipped through Jim's hourglass.

The woman, still weeping, stood like a shadow as a man donned in white approached her. "I am sorry," the voice said gently, "but there was nothing we could do." The woman's motherly eyes, tear laden, gazed at her lifeless son. "He was only twenty," she cried. "Why did he do it? He had so much to live for."

Richard Loveless '70

DOES A MAN KNOW

How does a man know
She's the girl who is right?
What clues will show,
Will he know at first sight?

What feeling has he inside,
Can he tell her by one kiss,
Does his heart want to burst with pride
Apart, is it she who he'll miss?

Can a man know, really for sure,
That he's found the one girl for his place?
Oh, how can he tell, is there a door,
Or is he just looking for lace?

Is that first date the one,
Will they be all the same?
Will he know she has come?
Will he know by her name?

What flicks through his mind
At the end of the date?
What answer will he find?
Will there be a debate?

Is he on cloud nine?
Does he wish it would end,
Or does he dream of the time
He might see her again?

The questions are numbered.
Answers turn each way.
Soon he'll ask why he wondered
And his words will say . . .

I KNOW

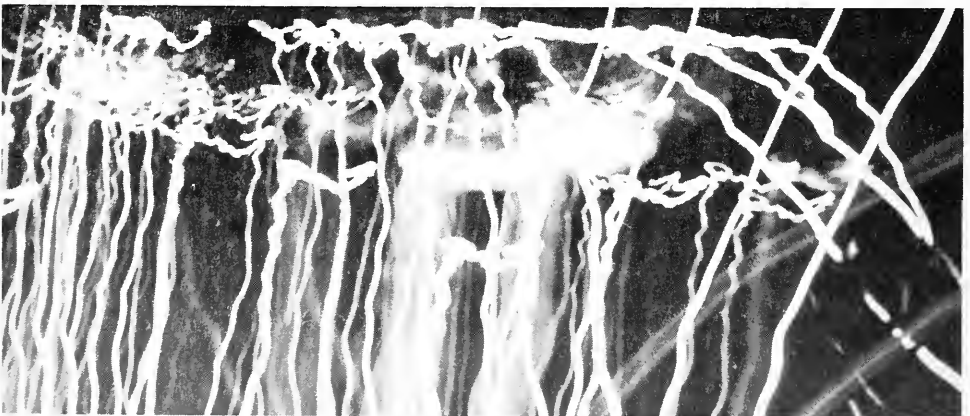
"SURFING"

In the realm of modern-day outdoor recreational activities little mention is given to the relatively new sport of surfing. The average East-coast American water sportsman swims in the summer and spends his winter on ice or snow. There are, of course, variations on this theme but these are the keynote activities of many outdoor sportsmen.

Surfing, however, contrary to common belief, is a sport which may be practiced twelve months of the year. In fact, winter usually produces the ideal surfing conditions. After Labor Day, the warm winds, crowded beaches, and gremmies all disappear. The surf is left to the surfers, seagulls, and other "hydrotropic forms of life." Although some conditions improve, the primary foreboding factor is temperature. When the water temperature falls below fifty-five degrees a full length wetsuit is a near necessity. This neoprene suit keeps the body relatively warm but restricts movement to some extent. This restriction, coupled with a slight loss of coordination, makes winter surfing somewhat more difficult than surfing during the spring, summer, or fall. Also, more care must be taken to avoid a "wipe out" the result being a swim for your board in thirty to forty degree water.

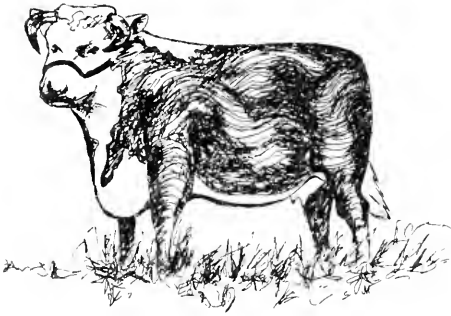
The northeast storm usually produces a surfing utopia. The surf builds, and the waves sometimes attain heights of ten to fifteen feet. To attempt surfing during a storm, however, would be suicide. The wise surfer waits for the inevitable west wind which nearly always accompanies a Northeasterly. This offshore breeze usually produces four to six foot sets of perfectly formed "glass." No sooner does the weathervane change its direction than the boards enter the surf. The thrill of shooting the curl of a six foot wave is unique and unlike that of *any* other sport.

Aside from the physical exercise and thrill, surfing provides a certain closeness with reality. The sun, the sea, the wind, and the sand all add to the realization of nature's wonder! The surfer may not always express these feelings verbally but undoubtedly they give him the incentive to keep him searching for that perfect wave.



Credit — David Kamison

HEREFORDS



The Hereford breed of cattle originated in Herefordshire, England. The land around Herefordshire, famed for its grass and cattle, is bound on the west by Wales and on the north by Shropshire. The land is hilly to rolling with rather well-defined valleys.

The farmers of Herefordshire depended more on grass than meadow crops to support the production of beef. The Hereford

cattle obtained most of their nourishment from grass.

The earliest records of the cattle in Herefordshire describe large, solid, red cattle with wide-spreading horns. Some of the larger native cattle were used for pulling the plow. They were used mainly in the early days for this task because they did not yield high-quality beef.

It is not definitely known where the color pattern of the Hereford and the breed's other characteristics originated. One suggestion is that cattle with red bodies and white faces were brought from Flanders. Another suggestion is that a red bull with a white face was brought from Yorkshire to Herefordshire. It takes four or five crosses to get a fixed color pattern. The Hereford color pattern is that of a white face, red body and white underline and some additional minor characteristics.

Benjamin Tomkins was one of the earlier improvers of the Herefordshire cattle and is often referred to as the founder of the breed. He and his son bred cattle that were quite dark in color, with mottled faces. The Tomkinsees used two cows, "Pigeon" and "Mottle," and a bull called "Silver" for foundation stock. The descendants of these were bred with draft cows to get more size and substance. The Tomkinsees succeeded in establishing an easier maturing type with shorter legs, more refined bones, and very high fleshing qualities.

William and John Hewer of Gloucestershire, breeders of Herefords, are largely responsible for fixing the color pattern. They bred cattle with scale and improved their quality.

The herd of T.J. Carwardine contributed more directly to modern American Herefords than any other English herd. A bull, "Ford Wilton," proved to be a sire that gave Herefords a degree of refinement about the head and horns. Some of his best sons were brought to America.

During expansion of the breed in its native country there was a move to reduce its extreme size and to improve its thickness and smoothness.

One of the early breeders in the United States was T. L. Muller. He was the first secretary of the American Hereford Breeder's Association. He shipped carloads of bulls to the range country to create a demand for the breed.

The most famous of Hereford cattle established in the United States was founded in 1877 by Charles Gudgell and T. A. Simpson. Gudgell and Simpson referred to a very concentrated form of line breeding.

Of all the individual cows imported from England, "Dowager 6th 6932" made the most important contribution. She was mated to "Anxiety 4th" owned by Gudgell and Simpson.

The Wyoming Hereford Ranch is the most important breeder of the Range country. The ranch is owned by H. P. Crowell. There are few herds today that can be compared to the performance of the Wyoming Hereford Ranch in show string competition since 1938.

Other notable range country herds include Mousel Brothers, with their "Beau Mischief" line, the Hazlett Herd, and the herd of C. M. Largent and Sons.

Hereford cattle have given an excellent account of themselves at feeder calf shows, in fat steer competition, and on the market.

Breeders of Hereford cattle today regard the color pattern rather carefully. Breeders object to excessive red on the neck, a long length of white along the top line, and black hairs in the switch.

The modern Hereford type should show good length and scale with bones ample to support the animal. The width should be carried uniformly along the entire top line and rump. The rump should be long, wide, and well covered. The rear end should be deep and full, and it should carry down to the twist.

Some of the practical advantages of Herefords is that they are practical feeders, they are relatively early-maturing, they can stand heat and cold winters, and they are the most rugged of the common beef breeds.

Breeders are trying to improve the leg form and the heavy dewlap of Hereford cattle. One objection of the breed is that it is more susceptible to cancer and pink eye. They also have a "tie" in the middle of the back. It can be corrected by a simple surgical operation.

Today the breed is found in every one of the fifty states and in twenty other countries. The breed is very highly favored where people are interested strictly in beef.

Today the American Hereford Association has a total registry exceeding 2,500,000 polled cattle. This is double the number of all other major beef breeds. The leading states in terms of numbers of registered Herefords are Texas, Nebraska, Oklahoma, and Montana.

Hereford breeders are constantly striving for higher goals. They want an animal with more length and scale, along with high quality. The Hereford breeders want an animal that makes fast gains on practical feeding.

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MARBLES

I remember when life was simple. It was a time when my whole world was a city block. The world's troubles were none of my own. I cared not for riches, only marbles. I loved my Mother and Dad. I loved the world and everything in it. I was seven. Now I'm twenty and full of hate. Why? I lost my marbles!

TO DUST

Darkness all around, just darkness; that is the way it had been since they last viewed me. Even here, now in darkness, only the smell of pine, the scent of flowers pervade. And I can hear the voices above me, the sound of tears as they hit the parched ground. And I can hear the preacher say his piece. Then there is only the sound of dirt; shovel after shovel — of dirt.

FAILURE

A shot rang out. The bullet, that shining metallic destiny, had met its mark. I had always tried to do my best for my country, my best to stop the hating and killing. But I failed, and the hating snuffed me out like a cigarette butt.

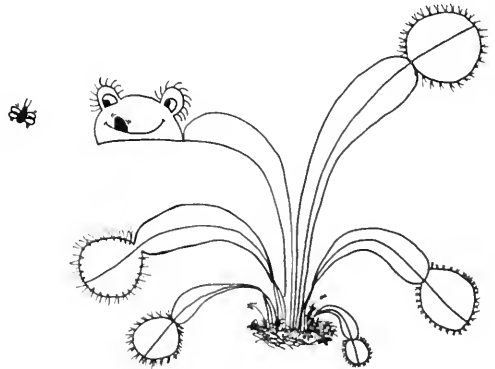
THE BOX

The children sat with their eyes glued to the image that faced them. They had been sitting there all of their lives. They felt sure that they now knew all about the world around them, for the box had told them everything. The voices and faces inside the box talked to them as they sat, all eyes riveted to it. One day the box said, "Kill all of those who oppress you!" And they did. Then only the box remained.

John D. Martin '70
Illustrated by Norman Mogel '71

THE TRAP

The Venus Fly Trap grows and waits
For an unwary meal to come its way.
Its bright leaves, like two dinner plates,
In a flash, snap shut on its prey.
Then, still again for another day.



SCIENTIFIC RESEARCH IN CHEMISTRY

Many students on campus are of the opinion that because a man teaches a course, all his campus activities center around that course. However, it should be brought to their attention that along with their teaching profession, many of our professors also involve themselves in theoretical or purely scientific work. In interviews with Dr. Elson and Dr. Goldberg of the Chemistry department, the following information was obtained concerning their interests in the scientific field.

In a recent interview, Dr. Elson stated that all students of Chemistry know heat is given off or absorbed in practically all chemical reactions. However, the difficulty arises that these heats are measured through many tedious experiments. He feels that it would be most desirable to be able to predict in advance the heat change for a chemical reaction. This is the heart of his research.

Over the years he has assembled data and formed a hypothesis to find a workable equation to predict the quantity of heat involved in a reaction and also to be able to tell if the reaction will take on heat or give it off. Through the use of the bonding data between the atoms involved in the reaction and other data, Dr. Elson feels that some progress has been made, but the final solution has not yet arrived.

The *Journal of Chemical Education of the American Chemical Society* feels that his ideas warrant enough credit to be published, and his first paper appeared in the September 1968 issue. Other papers have been scheduled to be published in 1969.

The research part of his study is relatively simple because most of the data is available. The stumbling block is in assembling this data into a logical, workable equation. As far as being successful is concerned, Dr. Elson will not make any prediction about the outcome and hopes he has not started publishing prematurely.

In an interview with Dr. Goldberg, he discussed the research he has been involved with at Delaware Valley as being a follow-up of some work he did at the University of Arizona in Tucson. While there, his work involved energy transfer of organic molecules. He found that when molecules were irritated with certain types of light, energy was observed being transferred from an organic molecule to an inorganic molecule. In our own laboratories with aid of senior, Charles Upton, and juniors, Harry Zimmerman, James Cervilli, and others, he is attempting to establish whereby these energy transfers can be examined, using photochemical techniques. In the preliminary experiment using chromium compounds as the inorganic molecule, definite chemical changes were observed using light of certain wavelengths. Now, more detailed experiments will hopefully give more precise data concerning these energy transfers.

Another idea of Dr. Goldberg involves the complex organic molecule pyrene. He stated that the molecule in different solvents gives off different ultraviolet spectra for no apparent reason. Therefore, upon completion of the energy transfer experiment, he will study pyrene in more detail and try to arrive at some conclusions as to why this molecule acts in this manner.

ENDURANCE

In this time of winter — the edge of spring,
Life hangs on one or two goals.
What happens if they fail you?
Something inside dies waiting for the change of seasons.
Life seems not worth living.
“The agony of defeat” is the story of many.
How it is borne is the story of man.
Like the hard, ice-crusted ground, we must endure “winter”
Until “spring” frees us from the pains of uselessness.



Credit: L. Ivins Smith III

CHALLENGING YOUTH IN AGRICULTURE



Agriculture, one of America's most dynamic fields, offers unlimited opportunities for young men and women who have interest and experience in this area. Ninety percent of all the jobs available to high school and college graduates are directly or indirectly related to agri-business. Forty-five percent of these jobs are directly related to the aspect of production.

Since the year 1928, the Future Farmers of America, commonly referred to as the FFA Club, has been challenging youth to enter this field of opportunity. The FFA has been responsible for training many excellent leaders in agriculture and responsible citizens in every community.

The FFA is an integral part of Vocational Agriculture Education, working in cooperation with the State and National Vocational Acts. Although nation-wide, it is not a state or federal program, but a self-supporting, non-profit organization. With approximately 450,000 members from 14 to 21 years of age, its aims and purposes include the development of leadership, sportsmanship, service, cooperation, scholarship, recreation, and citizenship.

Last year I had the honor of serving the Pennsylvania association of FFA as State President. This gave me an excellent chance to challenge the youth of Pennsylvania. Shortly after being elected to this office, I spent one week at Pennsylvania State University attending the Annual Leadership Training Conference. My fellow state officers and myself were briefed in social conduct and many areas related to the responsibilities of my position.

In October, I traveled to Kansas City to serve as state delegate to the National FFA Convention. I met with the secretary of the Pennsylvania Department of Agriculture in November to discuss various problems facing agriculture. During the month of January, I presided over the State Convention at Harrisburg. The national officers and I participated in half-hour television interviews on WFIL-TV in Philadelphia. I also attended various public functions in Washington, D.C., Philadelphia, and Pittsburgh. These are only a few of the activities in which I participated during my term of office.

I feel I can sum up my experiences as State President by saying that information, plus inspiration, plus recreation, plus perspiration, have marked a milestone in my life that will never be forgotten.

VARANO

There once was a man Varano,
He was a very happy man.
For he had a girl whose name was Dee,
A nurse to train was she.

He was a happy man, for she gave him her hand,
And she was his bride to be.
Then one day, oh it's sad to say,
Something there came between.

And that girl who lost her man Varano,
Shall never know from 'ere she came.
For that girl who lost her man Varano,
Shall only have Dee for a name.

How it hurt the man Varano,
For he couldn't understand.
He had treated her right, and just for spite,
She left him there alone to stand.

And the ways went by, how their hearts did cry.
Soon they were together again.
Now they'll laugh and cry until the day they die.
Varano is a man of men.

Brian Rice '71

Illustrated by Quentin Schlieder '70

THE MISTY TOWN ROAD

The air cleaned
By the torn and bleeding sky
Beckons me to the window.
The street lights
Give but little light
For me to write what I see,
But cause inspiration
As my mind wanders down the Road.
The puddles of rain water
Stare a cold mystery
Back at their observer.
A train rumbles in the distance
Fading as it goes,
Leaving me to the quiet
To ponder my woes.



RECREATION FOR TOMORROW

Editors' Note: The following is summary of a paper presented by Mr. Pysher at the 23rd Annual Soil Conservation Society of America meeting in Athens, Georgia on August 19, 20, 21, 1968.



Today we are seeing what has been termed a recreation explosion. Americans now spend \$30 to \$40 billion on recreation annually, which is twenty times more than what was spent for recreation in 1900. But what has caused this large increase in spending?

A hundred years ago, Americans worked, on the average, about seventy hours a week. Today we work forty hours a week and at a much higher level of productivity than ever before. Experts now predict that a decrease will come about in the forty-hour week but the productivity will still be high. Therefore, even more and more leisure time is being created and our present economy is now providing Americans with more money than ever before. So more time and money are given to outdoor recreation.

The modern automobile, with all its great advanced improvements, and the new interstate highway system allow people to travel further and faster than ever before. So with time, money, and transportation available, Americans are constantly seeking new adventures and new places and things to see. Consequently, the demand for recreational facilities is greater and becoming greater every year.

The present facilities of recreational areas are used by an estimated ninety percent of all Americans at one time or another. In total, people will participate in one activity or another on 4.4 billion different occasions and it is expected by the turn of the century this figure will triple itself. The movement of people from populated areas to the surrounding recreational areas is causing a facility shortage so that available areas can no longer facilitate all needs and uses. In California, campgrounds and picnic areas are over-used by more than thirty percent. The United States Forest Service estimates that camp and picnic grounds on National Forests receive seventy percent over-use. This over-use of facilities is common over the entire nation and is getting more severe.

In 1958, Congress decided that a nationwide study should be made of outdoor recreational facilities. On June 28 the Outdoor Recreational Resources Review Commission was set up. The act, Public Law 85-470, authorized its formation and set forth its goals:

- (1) To determine what the outdoor recreational needs and wants of the American people and what they may be in the year 2000.
- (2) To determine what resources are available to fulfill these needs now and in the year 2000.
- (3) To determine the policies and programs which are needed to meet the present and future needs.

Studies made by ORRRC pointed out that the total demand for recrea-

tion is a complex mixture. People all differ in their wants and needs, physical abilities, funds, mobility, and the time they have available for recreation. Demands change with age, the region of the country resided in, and whether one lives in rural surroundings or in a city. Demands also change with income, with the lower brackets being less demanding and demands increasing on up the line. Educational and occupational status improvements also raise recreational demands.

The most surprising finding of the ORRRC is that most Americans are easy to satisfy. Most of them settle for simple activities just so they are next to nature. They mostly prefer driving and walking for pleasure. The sports and games are also enjoyed by the active members of the population. The ORRRC is now seeking other ways to satisfy the population and find ways to solve the shortage of facilities.

Outdoor recreation is comprised of various parts. It consists of the area itself, the activities, and the recreationists. These parts could be considered the same as the parts of an automobile. Within the different makes of automobile these parts vary and so do the parts of recreation vary.

Areas vary also in accessibility, in condition, and in size. The accessibility depends mostly upon its location in the country and its distance from population centers in the area. Area conditions can include man-made and natural characteristics. These conditions must be recognized, and, if they are satisfactory, an area can easily be set up. However, they must be maintained. In 1872, Yellowstone National Park was set up because of the area's excellent water conditions and the fact that it was on public land. We must also consider the amount of certain facilities in an area, whether they be game fields, picnic tables, golf courses, etc. Area size is merely the size of the land involved. Tracts over 100,000 acres are called wildernesses and those under 100,000 acres are known as wild areas. Area size is determined by the number of people to use the location, just as the numbers of different facilities are dominated by the number of people who have to use the facilities.

The activities of outdoor recreation vary mainly in their extent of contest and expertness, that is, how competitive they are and what caliber of people perform in them. Recreationists vary in their knowledge of an activity and their skill in that activity.

The ever increasing demand for all types of outdoor recreation has caused much concern due to the reports given by the Outdoor Recreational Resources Review Committee in 1962. It was in that same year that Congress saw a need to devote more assistance to developing outdoor recreation areas. It was at this time that the Soil Conservation Service's responsibilities were broadened to include helping private landowners develop their land properly for recreation.

The Soil Conservation Service's technical assistance program now considers many other uses for land or water. They consider the suitability of land and water for recreation, they offer technical help in planning land and water areas for recreation, and, they give landowners economic information on developing land and water areas for recreation. They provide these men alternatives plus other information useful in developing these areas. Also owners are informed of the profits they can reap from such an operation. The Soil Conservation Service now has this new role in addition to its main job of conserving soil and water.

After the landowner has contacted the Soil Conservation Service, he must sign a Soil Conservation District Agreement and become a co-operator. Then a Soil Conservationist will go to the tract and develop a conservation plan for the area. Included in the plan will be a soils map, an interpretation of the soils on the map, and a list of conservation practices needed on the land. This plan will be used to determine where the soils are best suited for a lake or a parking lot. The locations of the different use areas are marked on a photograph in the plan. These practices indicated in the plan are designed to control erosion and they are suggested with the landowner's needs taken into consideration.

Once the plan is drawn up and the landowner finds everything planned to meet his needs, the application methods can begin. The Soil Conservation Service technician will supervise the construction and survey of all of the practices and design them to approved standards. The technician can then advise the owner as to which grass and legume mixtures to plant on the excavated areas and what materials he will need to complete the construction. Because of the working agreements of the Soil Conservation District with other agencies, the landowner can also obtain assistance in many other areas.

The goal in outdoor recreation is to bring together land, water, and people in such a way that all will prosper. In reaching this goal, the Soil Conservation Service has provided technical assistance in land use for recreation purposes.

With the ever-increasing needs for recreation, the Soil Conservation Service, like many other public and private organizing programs, insures that the people of America will have adequate "Recreation for Tomorrow."

Richard Loveless '70

Illustrated by Quentin Schlieder '70

I AM A SOLDIER

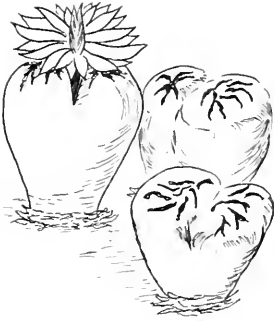
I am a soldier in this jungle,
Far from where I dream.
I dream of home, of the peaceful sunset,
And the girl there waiting for me.

I'll stay if I have to, kill if I must,
In this gruesome way.
It's not that I want to, but if I have to.
Oh Lord, forgive me on this day.

I want to go home to my family and friends,
To the girl I left behind,
For I am a lonely and tired soldier.
I want to put this out of my mind.



“LIVING STONES”



Lithops salicola

Few plants surpass the xerophytes in their morphological adaptations to their environment. Among the xerophytes, the *Lithops*, or “Living Stones,” exhibit the greatest environmental adaptations.

The genus *Lithops* was designated to this group of plants by N. E. Brown. He derived the name from the Greek words “lithos” meaning stone, and “ops” meaning face. The genus *Lithops* is placed in family Aizoaceae, a family which represents a large number of the South African xerophytic plants. All of these plants, commonly called “Vygies” in South Africa, were formerly grouped into one genus called *Mesembryanthemum*. N. E. Brown and G. Schwantes were re-

sponsible for subdividing this group into about one hundred and forty different genera, one of which is *Lithops*.

The genus can be conveniently divided into two sections: (I) *Afenestratae* and (II) *Fenestratae*.

In *Afenestratae* the upper surface of the leaves appears to be opaque, although in reality it allows the passage of sufficient light for photosynthesis.

In *Fenestratae* the upper surface of the leaves is either entirely transparent, or is perforated by transparent pellucid areas.

A *Lithops* plant consists of two short leaves forming an inverted cone, the base of which is level with the soil surface. These turbinate bodies are supported on a reduced woody stem. The nature and color of the upper surface of the leaves are the criteria used to subdivide the genus into its component species.

The flower, which is produced singly from a fissure between the two leaves, has a corolla containing many yellow or white petals. The four to seven lobed calyx, which is exerted slightly above the leaves, is not membranous. The style on the inferior ovary is reduced to such a degree that some authorities consider it to be lacking. The ovary has from four to seven locules, with placentas occurring on the outer walls or floors of these locules. The flower contains many erect stamens in a column.

The fruit is a capsule which contains four to seven locules and four to seven valves. The valves have one stout, central keel which is split at the apex. The wings are membranous.

The seeds are minute, each with a nipple at one end. They vary in shape according to species. They may be round or rotund, smooth or rugulose, and totally or partially dark brown. The seeds may either be opaque or translucent.

The history of the genus is quite interesting. The first notation of *Lithops* was recorded by Thomas Burchell in his famous book, *Travels in the Interior*

of South Africa (1821). The following passage from this book describes the plant: "On picking up from the stoney ground what was supposed a curiously shaped pebble, it proved to be a plant, and an additional new species to the numerous tribe of Mesembryanthemum, but in color and appearance it bore the closest resemblance to the stones between which it was growing."

Burchell also made a drawing of the plant from which Haworth described and named *Mesembryanthemum turbiniforme*. Subsequently N. E. Brown renamed the plant *Lithops turbiniformis*.

Burchell made his discovery on September 14, 1811, at Zand Vlei in the Prieska District of South Africa. It was not until a century later that the species was rediscovered in the same area by Dr. Pole-Evans.

Mesembryanthemum pseudotruncatellum, discovered in 1908 by Burger, was the second *Lithops* species to be found. It was found in Damaraland, Great Namaqualand, in the vicinity of Windhoek.

The third species to come to light is attributed to Leslies, who in 1912 discovered *Mesembryanthemum Lesliei* near Vereeniging.

These early discoveries illustrate the wide distribution of genus in South Africa, as Vereeniging and Windhoek lie far apart, and they both are about five hundred miles from Prieska. However, the distribution of the individual species is somewhat confined to small areas.

With the exception of a few South-West African species, most species do not overlap in their distribution.

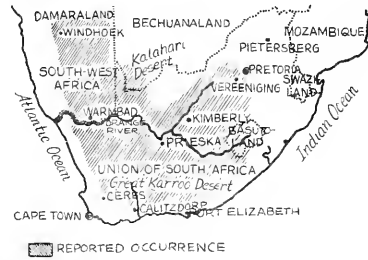
The morphology and physiology of the *Lithops* is quite unique. The plant body consists of two semi-conical, inverted water storing leaves attached at their pointed end to a very short stem which imperceptibly grades into a well-developed root system. The length of the internode is comparable to the width of the leaf, and is called the insertion zone. The stem is not free and only becomes so after the succulent leaves have shrunk and perished. The remains of the old leaves are dry and papery and persist, enveloping the stem, and serving to protect the new leaves in their early stages of development.

A young plant does not branch at the growing point (located at the base of the fissure), but a new pair of leaves is formed which encloses between them a new growing point.

The fissure which separates the two leaves is formed perpendicular to the previous fissure. Thus each year when new leaves form they are opposite to the old leaves, which will soon disappear.

After the plant flowers, a new leaf pair is formed on both sides of the terminal flower.

The sides of the *Lithops*' body are referred to as the mantle. The mantle, which is almost impervious to water, is in immediate contact with the soil, and thus very little light is able to reach it. The chlorenchyma, or food-synthesizing apparatus of the plant, appears as a thin layer of green tissue lying directly inside the mantle. In the center of the conical body is the transparent water-storage tissue. The shape of the plant varies according to the turgidity of this tissue. The natural imbedding of the plant in the material in



Distribution of the Genus *Lithops*

which it is growing is believed to be one of the water conserving mechanisms of the plant body. This mechanism reduces the area exposed to the air and sun, thus reducing water losses due to evaporation and transpiration.

The chlorophyll-containing cells line the inner surface of the mantle, which means that for the most part these cells lie below the soil level. Hence, all light must enter through the window-like top.

The culture of most plants is dependent on their native habitat, their morphology, and their physiology. This is also true for the *Lithops*. From the previous factors discussed, the reasons behind the care of these plants becomes more evident.

Lithops should be planted in a rather large pot (large in relation to the size of the plant due to the deep, well developed root system of these plants) with a well draining soil mixture of one part sand and one part rich garden loam (leafmold is especially good). A little charcoal may also be added to the mixture.

Keep the leaves out of the soil, but support them with coarse gravel. The plants should be exposed to the sun and the air during the day, and if possible, they should be maintained at a temperature of about fifty degrees at night. During the winter these plants should be kept at a temperature of about forty degrees.

The plants should seldom, if ever, be fed. If they are fed, a weak solution of liquid fertilizer is most satisfactory.

"Living Stones" require very little water. Some points to keep in mind are:

1. NEVER water these plants when the old leaves are withering and the new body is forming.
2. Increase the water in the early fall when the plants begin to flower. This period corresponds with spring in South Africa.
3. A good way to provide water to the plants is to plunge the pots in which they are growing into pebbles, and then water the pebbles.

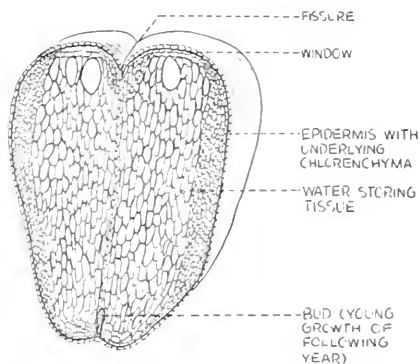
It should be noted that the high humidity of our climate causes the plant bodies to elongate more than they would in their natural habitat.

The pH factor for *Lithops* is negligible. However, many growers add lime to their soil mixtures when potting these plants.

In growing these plants from seed, the seed is sown in the early summer in a soil mixture similar to that in which the established plants are grown. The seed is barely covered, although some growers lightly sugar the seed pan with sand. The seed is kept moist until after germination, when the plants are gradually dried off. Damping off is the greatest cause of seedling loss.

One of the greatest pests of established plants is the cactus mealybug. Malathion is an effective control for this pest.

Overwatering is the greatest cause of loss of established plants.



Longitudinal Section through plant body. Redrawn from *Lithops*, G. C. Nel. Hortors, Ltd., Cape Town, Union of South Africa, 1946.

Lithops are difficult to find in their native habitat, since they mimic their surroundings to a remarkable degree, and in drought are much contracted, sunk into the soil, and covered.

L. Lesliei grows in ironstone soil. The rust color of the plant and that of the soil are almost indistinguishable. Another species, *L. gracidelineata* has a whitish tint practically identical to the quartz pebbles among which it grows.

The reasons for this mimicry are completely speculative. The suggestion that perhaps it is to foil small vegetarians is somewhat questionable since few incidents of damage to plant bodies have been recorded in the wild. In addition there are insufficient numbers of these plants to sustain a species of animal, no matter how small its size.

These curiosities of the plant kingdom are in danger of becoming extinct in the wake of careless collectors. However, seed from many species is being collected and is being made available to botanical gardens and specialists around the globe.

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Special thanks must be given to Mr. Charles Bottomley, Curator of the cacti and succulent collection at Longwood Gardens, whose invaluable assistance with this article was deeply appreciated.

Larry Gerber & Donald Koontz '70

FORM AND FUNCTION

The modern dairy farmer of today must not only have a complete knowledge of feeding and management practices, but he must be keenly aware of the practical aspects of dairy cattle type characteristics as a necessity for breeding topnotch dairy cattle. Breeders of purebred dairy cattle today realize their principle objective must be to improve type characteristics which will contribute to the overall usefulness of their dairy cattle.

Research has proven that there is a limited correlation between type and production. Interrelation between form and function plays a major role in breeding and selection within progressive dairy herds. The dairyman knows

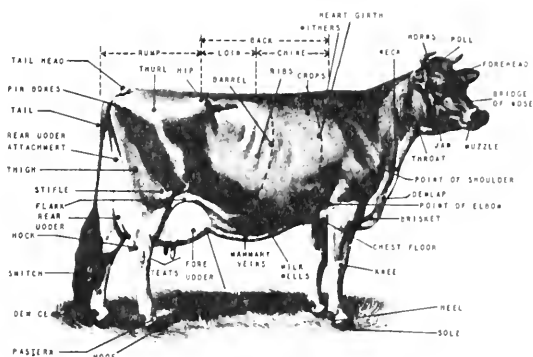


FIGURE 1
Points to be judged on a Dairy Cow.

Credit: GLEANER, March 6, 1964

character, body capacity, and mammary system.

General appearance encompasses the overall eye appeal of the individual. The desirable cow should be large and upstanding, possessing balance and symmetry. This is to say that her head should be clean cut and proportionate to her body. A broad muzzle and strong jaw are indicative of strength and the ability for a large intake of feedstuffs. Open nostrils and bright alert eyes display vigor. The shoulders should be snug and blend smoothly into the general contour of the body. The back should be well carried being straight and strong with vertebrae well defined. A square rump with broad hips and wide pins facilitating a neat tail setting are desirable. Straight and squarely placed legs ensure good moving ability.

Dairy character is displayed by a long lean neck, sharpness at the withers, and well sprung flat-boned ribs. The skin should be loose and pliable.

The third category, body, deals with the depth and width of heart and chest. The ribs should be highly and widely sprung, giving the cow a capacious barrel. Sufficient depth and width of body provide the necessary capacity for large intakes.

The last and possibly the most important part of the cow is the mammary system. A strongly attached udder which is well balanced and exhibits fine texture indicates heavy production and a long period of usefulness. The fore udder should be long and should blend neatly in its junction with the abdominal wall. The rear udder should be high and wide in its attachment. The medium suspensory ligament should be strong and well defined. The teats should be of uniform size and length and squarely placed on the floor of the udder. Quality and texture of the udder is displayed in part by tortuous and prominent veining.

In conclusion, the specialized dairy cattle breeder and the commercial dairymen warrant much emphasis on type providing that high production accompanies it. The commercial dairymen, although not so much interested in type perfection, realize that a certain degree of ideal type is necessary for his cattle to accomplish their specific purpose and usefulness. As in the words of a well known dairy professor, Dr. George W. Trimberger of Cornell University, "In actual practice the emphasis on type decides whether the man should be listed as a practical dairyman or just a producer of some milk and dairy beef."

that a strong, upstanding cow stands on straight and strong legs. She must possess adequate body capacity and a well attached udder. Therefore, milk producing ability on a long life time span is demanded by those who are looking for the most practical cow, regardless of the breed.

When judging dairy cattle there are four basic categories which must be observed. They are general appearance, dairy

HARVEST

Walking along a winding dirt path
I noticed a bud approaching life, so
Small and delicate was the baby's
First cry, a cry of a boy.

With a timeless motion ever so slow,
The leaves unwrap to the warm air in
Which children ran as they chased a ball
Without a trouble, without a care.

The fragrance of the flowers added beauty to the air
Its colors were bright, and pure were
The two bodies caressed so tight,
In love now — and forever in love.

Then one night a cold draft came which
Killed the flower before its fruit appeared, separating
The two lovers which belonged together, but
Now a sea keeps them apart.

One can search the tree for fruit
But will find it bare and naked, fruitless
As were the hopes of the wife who
Learns that her husband was killed.

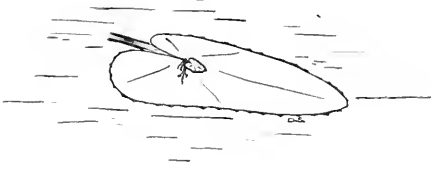


What happened to the missing fruit which
Now makes the tree worthless(?) — yes
worthless

Were the dreams of the widow as they
Buried him deep into the decaying earth.

If only there were some way to
Stop this cold draft which destroys.

WATERLILIES: THE GENUS NYMPHAEA



Waterlily "piggyback"

In this article I would like to discuss the botanical classification and the cultivation of waterlilies.

Waterlilies, i.e., plants in the genus *Nymphaea*, are classified generally into two main groupings, the hardies and the tropicals.

The hardy waterlilies all bloom during the day. They are considered to be more versatile than the tropicals because they do not need any attention to speak of during the winter months, hence their name. Members of this hardy waterlily group are grown throughout the North Temperate Zone except on the Pacific Coast. A few species are even grown in Alaska.

Tropical waterlilies grow, as their name implies, in areas where the climate is warm for the entire year. Tropicals are grown from Egypt to Australia, and from South America to Madagascar. Tropicals have all of the characteristics that hardies have, only on a much grander scale. They have a greater range of colors and grow wider and taller. Almost all of the day-bloomers have a fragrance (only a few of the night bloomers do). The flowers of the tropicals are borne on stalks, while the blooms of the hardies float, except when the plants are crowded. This is a fairly reliable way of separating these two groups. Tropicals are much more liable to hybridize because they set seeds much more frequently.

Botanical Classification

Waterlilies are further broken down into some fairly complicated taxonomic groups. I will briefly attempt to describe these and cite some examples of each.

Nymphaea, as a genus, is divided into two main sections, *Apocarpiae* and *Syncarpiae*. In *Apocarpiae* there are two sub-genera, *Brachyceras* and *Anecphyta*. Most of the day-flowering tropicals are species of *Brachyceras*, and are open for four to five days. "General Pershing" is an excellent example of this group. The sub-genus *Anecphyta* contains the Australian waterlily, *Nymphaea gigantea*. The variety *alba* stays open all night, while all others in the grouping are diurnal.

The second big section, *Syncarpiae*, contains the three sub-genera *Castalia*, which is hardy, *Lotos*, tropical, and *Hydrocallis*, which is also tropical.

Castalia's blooms are open three or four successive days. The pygmy waterlilies are in this sub-genus. Also contained in this sub-genus is the native European species, *N. Alba* and the American species *N. Odorata*.

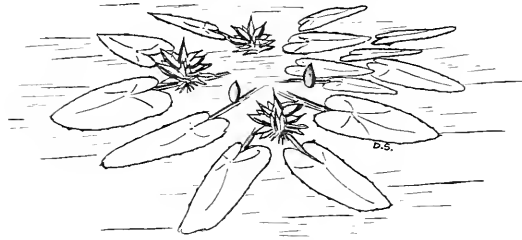
The sub-genus *Lotos* contains tropical nocturnal varieties, opening at around eight p.m. and closing at about noon on the following day. These plants bloom during three or four nights in succession. "Missouri" is a fine variety in this section.

Members of the *Hydrocallis* group are all tropical and nocturnal, but they have not been of much use to plant breeders and the group is not well known.

Propagation

The hardy group of waterlilies may be propagated by division, seed, runner, or by a strange process called fasciation.

Probably the easiest method is to divide the rhizome. Hardy waterlilies do not need propagating annually, but they should be propagated every three years or when loss of vigor is evident. When division is necessary for the *odorata* or *tuberosa* groups, cut each rhizome so that each has two or three eyes or growing points. Each section should be six to eight inches long. When



Hardy waterlily

planting, make sure the rhizomes are in a downward position because new roots will develop from the point bearing the leaf bud.

The Marliac type of waterlily consists of a thick, matted root system. To propagate, simply cut the root clump into many pieces, each having an eye.

Propagation from seed is a very tedious task because hardies do not set well and the seed take a long time to germinate (from three months to one year). To obtain true reproduction from seed, simply match parent to parent and protect the plant from extraneous pollen.

Fine soil preferably placed in a shallow pan, is needed in waterlily seed germination. Place the seeds on the soil, cover them with a thin layer of soil, and put the pan in a tub of water, letting capillary action disperse the water evenly and gently throughout the soil. After two days of this soaking, lower the pan one-fourth inch to one-half inch below the water surface. The water must be 70-80°F. After the seedlings have formed their first floating leaves, transfer to two inch pans and re-submerge to three inches.

Propagation by runner is another method of propagating new stock. However, only one of the hardy species, *N. mexicana*, produces runners, sending these long tender stolons out from its rootstock.

Fasciation is a strange phenomenon of which nobody knows the cause. It gives the appearance of the leaf being totally smashed into many small pieces, each being a perfect plantlet which is true to type. It is known, however, that this process occurs among some of the older varieties and that some are more likely to exhibit fasciation than others.

Tropical waterlilies may be propagated from seed, division, and by viviparous reproduction.

Propagation from seed is more rewarding in the tropics than in the hardies because many more tropical species and varieties set seed more readily and they germinate more rapidly. Seeds sown in January can be expected to bloom the same summer. This would be unheard of with hardies.

In the day blooming class, *Nymphaea capensis*, *N. coerulea*, and *N.*



Tropical waterlily

gracilis all bear seeds well. Night bloomers which set seed will include *Nymphaea lotus*, "Missouri," and "Mrs. George C. Hitchcock."

Hybridization work is being done quite extensively on tropical waterlilies. For hybridization, the best characteristics of the parent plant should and must be considered.

The best time to propagate the following summer's waterlilies is in late summer when the flowers are the most fertile. Making sure that the seed parent is fertile is very important because some varieties are sterile.

Selecting the seed plant is very critical. The bloom selected should be freshly opened. The day before its opening, open it, trim off its anthers and cover it with a cheesecloth to prevent the bloom from being pollinated by insects. In the afternoon of its first day of blooming, a sticky substance becomes noticeable on the stigma.

Selecting the pollen parent and performing the actual crossing is another important step. The pollen plant must be in its second day of blooming because the pollen takes this amount of time to ripen. This plant should also have been protected from contaminating pollen with a cheesecloth. The cross is made by stripping off a few of the anthers and placing them on the sticky stigma of the female plant.

The next task is to cover the hybridized flower with cheesecloth to avoid further pollination. Many flowers should be hybridized to ensure a better chance for success.

If the cross has been a failure, the seed pod and stem will rot within two weeks. If fertilization is successful, the seed pod will swell after two weeks.

Tuber division is a much simpler way of propagating tropical waterlilies. It is necessary to dig up the tubers before freezing weather, dust them with a fungicide, and store them in cool, moist sand. Cut off all new tubers from the old ones and store them separately. One month before planting time, place the tubers in pots and submerge them in water at 70-80°F. This induces leaves to form in two to three weeks. As they grow, raise the water level until it is warm enough to move the plants outside (around the beginning of June).

Viviparous reproduction only occurs in day-blooming tropical waterlilies. It is the process of producing live plantlets from the umbilicus of a leaf. This phenomenon is influenced by climate and latitude, with the southern species being more prolific.

As a viviparous waterlily matures, a discolored bump appears at the umbilicus, i.e., where the leaf and the stem meet. After a few days it breaks, with leaves and adventitious roots developing. These plantlets can be pricked off and placed in a shallow pool until cool weather comes. They can then be potted into larger pots using a rich soil mixture and a slow-reacting fertilizer. Under lights in the winter they become dormant and produce small tubers. After they have lost all floating leaves, a rest period of about three weeks is needed. Then they will again begin to grow. Some of the varieties of *Nymphaea* that are viviparous are "Aviator Pring," *N. daubeniana*, "Sunbeam," and "Baghdad."

Soils and Planting Out

Soil structure and fertilization are two important requirements for good growth and general plant vigor.

The generally-accepted soil mixture recommended for waterlilies is five

parts fibrous loam to one part partially rotted cow manure. Peat, leaf soil, and silt should be avoided. To each bushel of this compost, add four ounces of a slow-reacting fertilizer. Tropical waterlilies respond more dramatically to nutrient deficiencies and they should be fed every ten to fourteen days with two ounces of soluble fertilizer tablets per plant. A top-dressing of sand is desired to keep any organic matter from floating to the surface. Old pond sand should never be used because it is too strong and acidic. It tends to rot and ferment the plants.

The water should be taken into great consideration. The older and calmer the water, the better the planting will be because of the resemblance to native habitat.

The hardy waterlilies can be placed out in May and the tropics when the temperature reaches 79°F. Heated pools may be used quite effectively for waterlily culture as well.

Planting in containers is advisable for the sake of convenience. Containers facilitate for easy moving and elimination of walking on mud bottoms when the lilies need attention. Lilies should be planted in approximately twenty-four inch pans which are twelve inches deep. The pygmies may be placed in seven inch pans. One waterlily to a container is best because this promotes radial symmetry and avoids crowding. The depth of the water should be never less than six inches and never more than four and one-half feet deep. This depth, of course, varies with the plant. The deeper the water, the fewer but bigger the blooms.

One thing about waterlilies should always be kept in mind: always plant them in an open area that receives sun during the entire day. Abundant sun is needed to promote their luxurious growth and flowering habits.

The daily care of waterlilies consists of observing and curing deficiencies, removing dead and crowded leaves, and warding off pests.

Pests and Their Control

There are relatively few pests that bother waterlilies because deposits of calcium oxalate in the cells of the leaves and tannin deposits in the roots are toxic.

The most persistent pest is the waterlily aphid. The control for it is to either hose it off in the evening so that fish may eat them, or spray with malathion at one-half strength.

Japanese beetles are also a nuisance, along with leaf-eating beetles, caterpillars, and nocturnal moths. The control for these is the insecticide "Sevin." To prevent leaf scorch, spray on a dull day.

Leaf spot fungus attacks waterlilies also, especially in hot, humid weather. "Captan" is an excellent control. Removing old seed pods and leaves inhibits the spreading of disease.

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AMERICAN EXODUS



Joseph Smith

On the sixth day of April, 1830, a group of six people who had been previously baptized met in the house of Peter Whitmer, Sr. and proceeded to organize the church. They accepted Joseph Smith, a man who in 1820, had a vision of Jesus Christ and spent and gave his life in testimony to Him, as their teacher and leader in the things pertaining to the Kingdom of God.

This was the formal beginning of the Church of Jesus Christ of Latter-day Saints (Mormon). The early history of this church is one of particular interest, for it deals with the most severe religious persecution this country has ever known.

In June, 1830, the church was located around Colesville and Fayette, New York (two towns on the Susquehanna River near the Pennsylvania border). The 27 members were threatened with various forms of harassment by several Protestant ministers.

In early 1831 they were forced to move to Kirkland, Ohio (a town 30 miles east of Cleveland on the Lake Erie shore). At this time they instituted the "Common Order," a frontier mixture of capitalism and socialism, similar to the Amana Society. Their stay at Kirkland was intended to be a temporary one because it was felt that greater safety lay in the West. Membership had grown to over 1,000 by the end of that year. In 1832 mob violence threatened their Ohio community; many left. Some, however, stayed on for two more years in order to complete a temple.

Jackson County, Missouri was then chosen as a "permanent place." It was here that Zion would be built. By July of 1831 the "Mormons" started to arrive. They started to buy large quantities of land for present and future settlement. There were 31 "Mormon" families in Jackson County by August. A printing press was set up to publish a newspaper and some books. The number of families increased rapidly.

A "bad feeling" was slowly being created against the "Mormons" among the original settlers in Jackson County by a few Protestant ministers and fearful politicians. Fears of political, economical, and moral domination were stirred up. Rumors were spread of an alliance between the Indians and/or Abolitionists and the "Mormons."

A mob formed late in 1833 and demanded that the "Mormons" forfeit their land, cattle and guns, and leave Jackson County.

The Elders¹ asked for two weeks time in order to secure a vote.

¹An Elder is a local leader of the church.

The mob answered this request by burning and looting "Mormon" homes, by beating the men and boys, and by raping their women. Over 2,000 "Mormon" homes were destroyed in the first month. The defenseless "Mormons" fled across the Missouri River into Clay County.

The citizens of Clay County permitted them to rest a season within their boundaries, but petitioned them not to stay longer for fear that the same violence would again erupt. The Governor said he was powerless to help them in their plight, but offered them the northern part of Ray County for their settlement. They purchased over two-thirds of the privately-owned land and all of the public land in this area, and were eventually incorporated into Caldwell County by the Missouri Legislature. Guarantees were given of protection by both the State and Local governments. The "Mormons" then had a brief period of peace, but they prospered too well and soon became a political and economic threat to Colonel W. P. Penitton, a prominent member of the State Assembly. He attempted to disenfranchise them in the 1838 election, and some violence resulted.

The hatred towards the Indians and Abolitionists was directed towards the "Mormons." Fear of diminishing parishes added large numbers to the mob. The Governor, hearing only the worst, issued the "extermination order": "either exterminate the people called Mormon or drive them from the state"² (It was inferred that extermination of the 12,000 "Mormons" should be executed). The commander of the Missouri Militia, Colonel Hinkel, refused to carry out this order.

Instead he imprisoned several of the "Mormon" leaders, confiscated their guns, and drove them to the Mississippi River where they could escape to Illinois. Over four million dollars in land and 3,000 lives were lost because of the persecution.

In 1839 the group established a city called Nauvoo (Hebrew for beautiful situation) in Illinois. A year later, in 1840, the community was incorporated by the Illinois Legislature. They established universal free education, an outstanding University, and a detachment of the Illinois state militia. By 1844, Nauvoo was the largest city in the state, with a population of over 20,000. Many prominent men visited the city and commented that it was the best built and smoothest run city in the country.

Trouble arose due to the jealousy of other towns; greed of certain individuals, fears of certain ministers, and agitation by distant elements from Missouri. Joseph Smith, the prophet and leader of the church, his brother Hiram, and several other prominent church leaders were ordered into protective custody by the Governor on alleged charges.

While awaiting arraignment, Joseph Smith was martyred by a mob in Carthage Jail on June 27, 1844.

It was expected with the murder of Joseph Smith, the church would become fragmented and disintegrate. Instead, it continued to grow with Brigham Young as its new leader. In January of 1845, the Illinois legislature repealed the Nauvoo Charter, and by September of the same year, scattered settlements were under open attack. In reply to the Governor's plea that the "Mormons" leave, Brigham Young stated: "We propose to leave this country next spring, for some point so remote that there will not need to be any diffi-

²Executive order of Governor Boggs, December 3, 1838.



Brigham Young

culty with the people and ourselves.” The “anti-Mormons” wanted them to leave Illinois completely before spring and harassed their attempts at an orderly evacuation. On February 2, the first “Mormons” left Illinois.

The majority were able to leave Nauvoo by the fourteenth; choosing conviction over comfort. A camp was set up at Sugar Creek where the group organized and plans for the future were presented. The regulations at the camp were strict, but spirits were high.

In April, a new camp was begun at Garden, 140 miles west of Nauvoo. A village for the convenience of future exiles was also developed. Fields were planted and wells dug. The order was to plant so that others might reap. To avoid violence, it was decided that they travel on Indian lands, along never-before-used trails. Their destination was the “Great American Basin,” an area so unsuited for farming that it was thought corn could not even be cultivated there.

In June, Captain James of the U. S. Army approached these people and requested four companies (500 men) to fight in the Mexican War. At this time, most of the men were either sickly, crippled, or dead. The rest of them were needed to maintain the camp. There was every reason not to fulfill the Government’s request, for was the Government not, in part, responsible for their present state? However, Brigham Young called on the people to supply the needed men: “We feel the injuries of wrongs we have suffered; still we are Americans and if our services are required these services will be cheerfully rendered.” (The men were raised within 48 hours and later were to go on the longest infantry march in our country’s history, through uncharted desert.)

A pioneer company was selected to make the trail for the others. One hundred and forty-three men, two women, and three children departed in 73 wagons to blaze the trail as they traveled, building fords, placing markers, and planting crops.

Two months later, the first of the 12 larger companies, numbering some 1,500, arrived at their destination. “This is the place!” exclaimed Brigham Young as they entered the valley of the Great Salt Lake.

The land had to be flooded for three days before a plow could be sunk, still 80 acres were planted the first year. By spring, over 2,000 “Mormons” had settled in the valley.

A good harvest was expected and all fared well. However, just before harvest, farmers rode in from outlying areas to report hordes of black crickets coming in from the surrounding mountains and desert devouring everything in their path. The people were panic-stricken by the “muffled roar of thunder” these insects produced and they feared for their existence. They attempted to fight the creatures with fire and soil, but to no avail. Brigham Young exhorted his people to fast and pray while struggling to save their crops. They heeded his council, and the next day as they started out after the approaching crickets, thousands of birds came flying in from the west.

They dropped down onto the fields and devoured the crickets. The astonished people watched as the birds ate to their fill, then headed for the nearest stream, where they took water, disgorged, and flew back to their feast. Just before sunset the birds gathered once again to fly westward only to return on the following days. This was the first time sea gulls were ever sighted in this area. This was interpreted as a distinct sign from the Lord. He would deliver them from trouble in the valley as long as they kept their faith.

There are now more than 2.7 million "Mormons" comprising The Church of Jesus Christ of Latter-day Saints, the fastest growing church in the United States. The church has doubled its membership in the last decade. Having established the largest private university, Brigham Young University, located in Provo, Utah, the "Mormons" have contributed a number of Nobel Prize winners and other fine marks of achievement to our history. Truly, they are a living testimony to faith.



Temple Square, Salt Lake City, Utah, the center of The Church of Jesus Christ of Latter-day Saints

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